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|---|-------------|----------------------|---------------------------------|-----------------------------|
| APPLICATION NO.   | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO.             | CONFIRMATION NO.            |
| 10/550,413  | 07/18/2006  | Toshihisa Tomie      | 278727US2PCT                    | 2187                        |
| 22850 7590 01/29/2008<br>OBLON, SPIVAK, MCCLELLAND MAIER & NEUSTADT, P.C.<br>1940 DUKE STREET<br>ALEXANDRIA, VA 22314 |             |                      | EXAMINER<br>SAHU, MEENAKSHI S   |                             |
|   |             |                      | ART UNIT<br>2881                | PAPER NUMBER                |
|   |             |                      | NOTIFICATION DATE<br>01/29/2008 | DELIVERY MODE<br>ELECTRONIC |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

patentdocket@oblon.com  
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jgardner@oblon.com

|                              |                               |                                  |  |
|------------------------------|-------------------------------|----------------------------------|--|
| <b>Office Action Summary</b> | Application No.<br>10/550,413 | Applicant(s)<br>TOMIE, TOSHIHISA |  |
|                              | Examiner<br>Meenakshi S. Sahu | Art Unit<br>2881                 |  |

**-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --**  
**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 18 July 2006.  
 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.  
 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 1-34 is/are pending in the application.  
     4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.  
 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.  
 6) ☒ Claim(s) 1-34 is/are rejected.  
 7) ☒ Claim(s) 11, 13, 28 and 30 is/are objected to.  
 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.  
 10) ☒ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
     Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
     Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).  
 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
     a) ☐ All    b) ☐ Some \*    c) ☐ None of:  
         1. ☐ Certified copies of the priority documents have been received.  
         2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.  
         3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. _____                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>12/20/2005, 3/10/2006</u>                                     | 6) <input type="checkbox"/> Other: _____                          |

## DETAILED ACTION

### *Claim Rejections - 35 USC § 102*

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

2. Claims 1, 3, 4, 12, 14 -16, 18 - 21 and 31 - 33 are rejected under 35 U.S.C. 102(e) as being anticipated by Richardson (US 6,831,963):

**Regarding claim 1, 3, 16, 18 – 20 and 33,** Richardson discloses a method and apparatus for generating a laser produced plasma by irradiating a pulsed laser on material [abstract], where said material is a particle-cluster which consists of many particles coupled with each other by a molecular force [col 3 lines 39 to 41 and lines 45 to 46, Figure 4, claim 1], an electrical force, or a binder made of a material which vaporizes at temperature lower than the melting point of said particles [col 4 lines 1 to 3; aluminum has a melting point higher than the metallic chloride and bromide solutions].

Richardson also discloses a method where the particle clusters are mixed in a liquid at room temperature [col 3 lines 18 to 19] and the prepared suspension is ejected to form

a droplet [col 4 lines 47 to 58].

**Regarding claims 4 and 21**, Richardson discloses water, oils and alcohols can be employed as solvents for the suspension liquid [col 4 line 3].

**Regarding claims 12, 14, 15, 29, 31 and 32**, Richardson discloses making the particles as small as possible to effectively utilize the particle material and to drastically reduce debris [col 3, lines 13 to 17].

### ***Claim Rejections – 35 USC § 103***

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 2, 5, 9, 10, 17, 22, 27, 28 and 34 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson (US 6,831,963).

**Regarding claim 2**, Richardson's invention discloses all of the claimed limitations except for the method of cracking the particle-cluster to disperse the aggregating particles prior to plasma generation with heating by the irradiation of a laser.

It would have been obvious to one of ordinary skill in the art at the time of the invention

to modify Richardson's invention and include another laser for this purpose. Doing so would disperse the small particles more uniformly and create uniform plasma density.

**Regarding claims 5 and 22,** Richardson's invention discloses all of the claimed limitations except for a method where the particles in the suspension liquid are uniformly distributed.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Richardson's invention and include a stirring mechanism for the suspension liquid. Doing so would keep the number of small particles in the suspension liquid more uniform and create uniform plasma density.

**Regarding claims 9, 10, 27 and 28,** Richardson's invention discloses all of the claimed limitations except that the vaporization of the solvent by laser irradiation of a droplet is done in the separate space before delivering a droplet of suspension to the plasma generation space.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Richardson's invention and include a separate space for this purpose. Doing so would help maintain the vacuum in the plasma generation space thus saving both time and energy costs.

**Regarding claims 17 and 34,** Richardson's invention discloses all of the claimed limitations except that the particles that are generated in an environment where a gas flows and the generated particles are conveyed by the gas flow into a plasma

generation environment.

It would have been obvious to one of ordinary skill in the art at the time of the invention to modify Richardson's invention and include a separate space for vaporizing the solvent by a laser and then delivering the generated particles to the plasma generation space using a flow of gas. Doing so would ensure that the generated particles do not get scattered and that they are delivered into the plasma generation space, thereby increasing the efficiency of plasma production and therefore EUV light production.

5. Claims 6 to 8 and 23 to 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Richardson in view of Hertz et al. (US 6,002,744).

**Regarding claims 6 to 8 and 23 to 25,** Richardson's invention discloses all of the claimed limitations except for a nozzle ejecting a suspension liquid that is vibrated regularly for droplet generation.

However Hertz et al teach generating droplets of different sizes and at different frequencies through a small nozzle that is vibrated peizoelectrically [col 1 line 67 to col 2 line 2].

Given the teachings of Hertz et al. it would have been obvious to one of ordinary skill in the art to modify Richardson's invention and include a nozzle that is vibrated regularly for droplet generation. Doing so would produce droplets of the correct size and frequency so that the droplets can be efficiently irradiated by the laser beam and produce uniform plasma and thereby uniform EUV light.

***Allowable Subject Matter***

6. Claims 11, 13, 28 and 30 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

**Regarding claims 11 and 28**, prior art fails to disclose or teach a method of charging a particle-cluster and a method of electrically controlling the trajectory of the particle-cluster.

**Regarding claims 13 and 30**, prior art fails to disclose that a particle cluster contains tin, tin oxide or other tin compounds.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Meenakshi S. Sahu whose telephone number is 571-270-3101. The examiner can normally be reached on Monday - Friday 8AM - 5PM est.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Robert H. Kim can be reached on 571-272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

*ms*

mss  
January 17, 2008

*Jack I. Berman*  
**Jack I. Berman**  
Primary Examiner